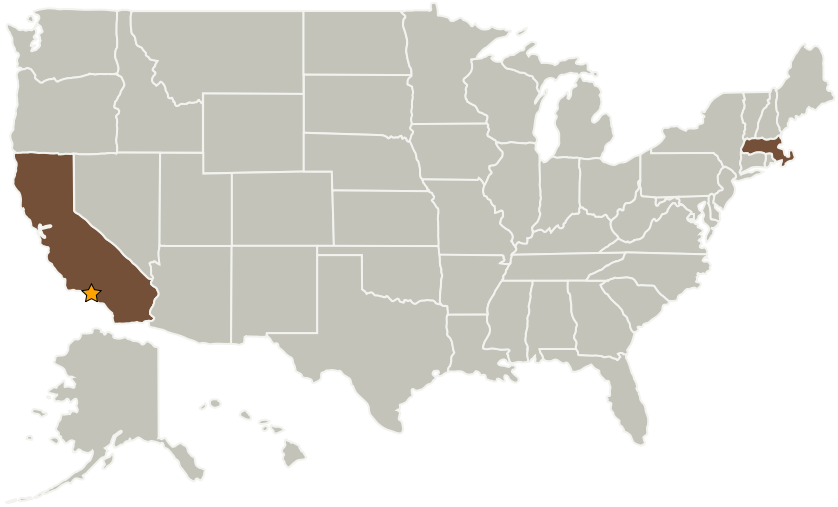
Highly Efficient Compact Laser for Planetary Exploration, Phase I

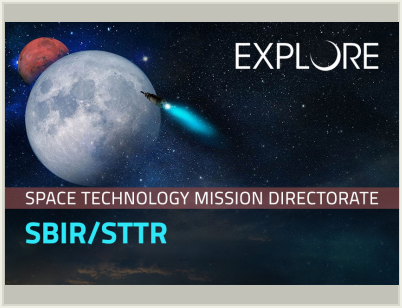
Completed Technology Project (2007 - 2007)

Project Introduction

In response to the solicitation for advances in critical components of instruments for enhanced scientific investigations on future planetary mission, Q-Peak proposes to develop an extremely compact, robust, efficient, Q-switched, solid state laser, producing 10-mJ, nanosecond-duration pulses, for use as a source for laser-induced breakdown spectrometers and lidar systems. One of our innovations is the application of "D-rod" laser-diode side-pumping technology to the laser material Nd:YLF, which possesses substantially higher energy storage and will provide significantly higher output energies for the same volume compared to the more common Nd:YAG laser crystal. The negligible stress-induced birefringence and greatly reduced thermally induced distortion of Nd:YLF will allow us to provide linear polarization and excellent laser-beam quality from a conduction-cooled system. Another innovation is the use of passive Q-switches, Cr4+: YAG or F2-: LiF saturable absorbers that will greatly improve laser reliability and also eliminate the size and weight associated with active Q-switching. A key factor of our design is quasi-CW pumping with a variable duty cycle, which will not only reduce power consumption but will allow for developing a variable repetition rate source (as high as a 1 kHz), thereby reducing the data acquisition time.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Q-Peak, Inc.	Supporting Organization	Industry	Bedford, Massachusetts

Primary U.S. Work Locations	
California	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers